

APPLICATION NOTE -29

CropScan
On Combine Grain Analyser

WHEAT 23 CALIBRATION

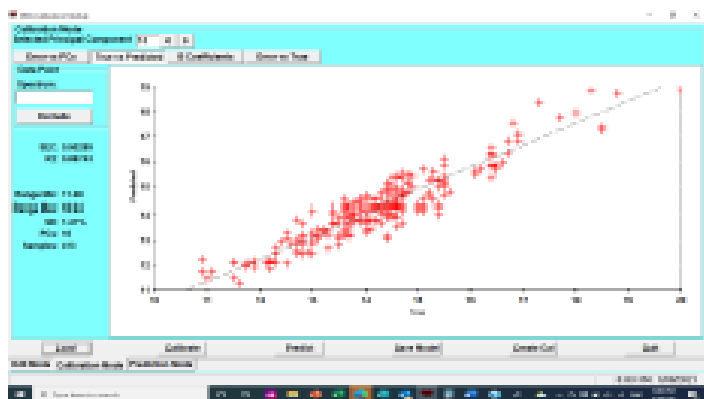


Figure 1 Protein Calibration Plot

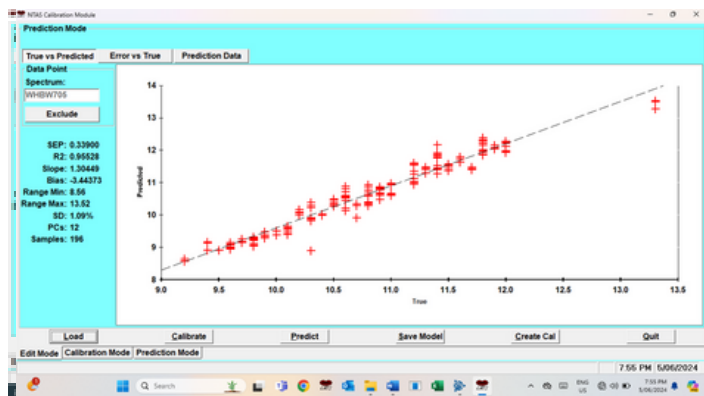


Figure 2 Moisture Calibration Plot

INTRODUCTION

Validation of Wheat Protein and Moisture Predictions Using CropScan 4000VT and Foss Nova Infratec Instruments.

- Objective: To assess the accuracy of wheat protein and moisture predictions made by the CropScan 4000VT compared to the reference values obtained from the Foss Nova Infratec.
- Methodology Overview: 70 samples were analyzed, and scanned in duplicate to evaluate model prediction and robustness

METHODOLOGY

- Sample Collection: 70 Wheat Samples were collected from a large Farmer in Northern NSW.
- Instrumentation:
 - o The CropScan 4000VT On Combine Grain Analyser is a Near Infrared Sensor which measures Protein, Moisture, Oil, and Starch. The Foss Nova Infratec instrument is an NTEp Certified Near Infrared Analyser used to reference the prediction of Protein, Moisture, Oil, and Starch and benchmark against the most common NIR sensor at grain elevators and receiving sites.
 - o The testing is done in a laboratory under controlled conditions. Field predictions would experience higher errors due to environmental factors such as dust, temperature, and chaff.

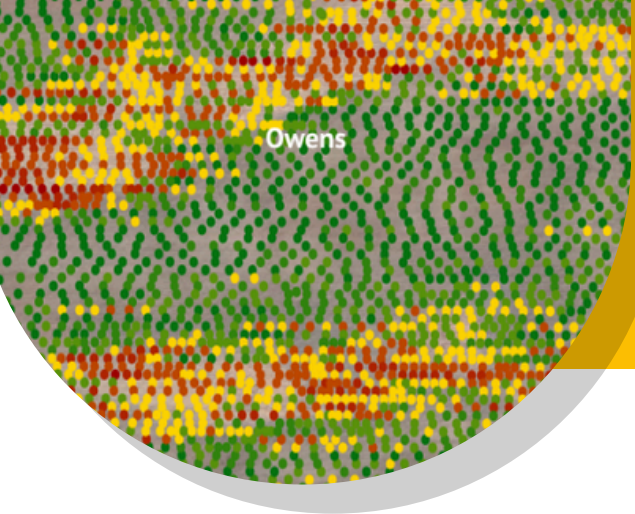
DATA ANALYSIS

The 70 samples were scan and analysed by the CropScan and Foss

The sample prediction results have been accessed for precision and accuracy,

- Precision is defined as the ability of an analyzer to measure the same sample twice. Typically, 10 samples of grain are analyzed in duplicate on the CropScan. The Standard Deviation of Differences between the duplicate readings is referred to the Standard Deviation of Differences
- Accuracy is defined as the difference between a reference method and the CropScan predicted results.

The Standard Deviation of Differences between the reference method and the CropScan are referred to as the Standard Error of Prediction (SEP). The following values represent 95% confidence levels or 2 X SEP.

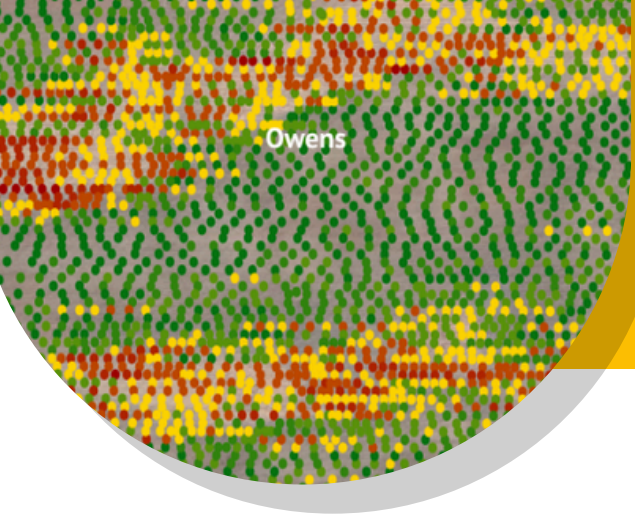


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RESULTS

Table 1. shows the prediction results for Protein and Moisture for 70 Wheat samples. The lab data for Protein, Moisture is from the Foss Infratech.

Sample ID	CropScan p%	CropScan M%	Lab P%	Lab M%	P% Diff	M% Diff
WHBW14	9.8	9.6	10.6	9.4	0.8	-0.2
WHBW14	9.6	9.7	10.6	9.4	0.9	-0.3
WHBW674	9.3	9.8	9.3	9.9	0.0	0.1
WHBW674	9.2	9.8	9.3	9.9	0.1	0.1
WHBW675	10.0	9.6	10.0	9.6	0.0	0.0
WHBW675	10.1	9.6	10.0	9.6	-0.1	0.0
WHBW676	11.8	10.0	11.8	10.1	0.0	0.1
WHBW676	11.9	10.1	11.8	10.1	0.0	0.0
WHBW677	9.8	9.7	9.9	9.6	0.1	-0.1
WHBW677	9.8	9.6	9.9	9.6	0.1	0.0
WHBW678	9.5	11.2	9.4	11.0	-0.1	-0.2
WHBW678	9.4	11.1	9.4	11.0	0.0	-0.1
WHBW678	9.3	11.1	9.4	11.0	0.1	-0.1
WHBW678	9.4	11.1	9.4	11.0	0.0	-0.1
WHBW679	10.1	9.4	10.2	9.5	0.1	0.1
WHBW680	9.4	9.5	9.4	9.6	0.0	0.1
WHBW680	9.4	9.5	9.4	9.6	0.1	0.1
WHBW680	9.3	9.6	9.4	9.6	0.1	0.1
WHBW680	9.3	9.4	9.4	9.6	0.2	0.2
WHBW681	10.2	9.8	10.1	9.7	0.0	-0.1
WHBW682	10.3	9.1	10.2	9.2	-0.1	0.1
WHBW682	10.2	9.1	10.2	9.2	0.0	0.1
WHBW682	10.2	9.1	10.2	9.2	0.0	0.1
WHBW682	10.2	9.1	10.2	9.2	0.0	0.1
WHBW684	10.3	9.8	10.1	9.8	-0.1	0.0
WHBW684	10.2	9.8	10.1	9.8	-0.1	0.0
WHBW684	10.1	9.7	10.1	9.8	0.0	0.1
WHBW684	10.1	9.8	10.1	9.8	0.0	0.0
WHBW685	9.5	10.8	9.4	10.7	-0.1	-0.1
WHBW685	9.5	10.8	9.4	10.7	0.0	-0.1
WHBW688	9.2	9.7	9.3	9.8	0.1	0.1
WHBW688	9.1	9.5	9.3	9.8	0.2	0.3
WHBW689	10.1	10.4	10.1	10.3	0.0	-0.1
WHBW689	10.1	10.3	10.1	10.3	0.0	0.0

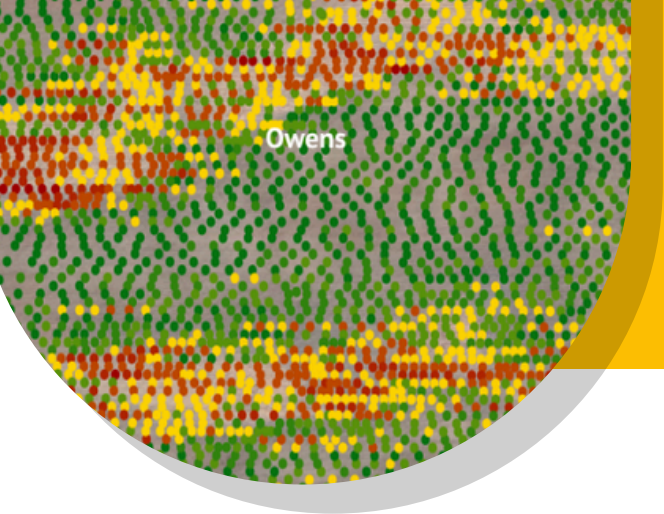


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RESULTS - CONT.

WHBW690	10.0	9.8	10.0	9.8	0.1	0.0
WHBW690	10.0	9.8	10.0	9.8	0.1	0.0
WHBW691	10.1	11.1	10.1	10.9	0.0	-0.2
WHBW691	10.1	11.0	10.1	10.9	0.0	-0.1
WHBW692	10.0	9.4	10.0	9.4	0.0	0.0
WHBW693	9.0	9.7	9.1	9.8	0.1	0.1
WHBW693	8.9	9.6	9.1	9.8	0.2	0.2
WHBW694	9.5	9.9	9.1	9.9	-0.4	0.0
WHBW694	9.6	10.0	9.1	9.9	-0.4	-0.1
WHBW695	10.0	10.0	10.0	10.0	0.0	0.0
WHBW695	10.0	9.9	10.0	10.0	0.0	0.1
WHBW696	9.2	10.6	9.4	10.6	0.2	0.0
WHBW696	9.4	10.7	9.4	10.6	0.1	-0.1
WHBW698	9.8	10.0	9.8	10.1	0.0	0.1
WHBW698	9.9	9.9	9.8	10.1	-0.1	0.2
WHBW699	10.6	10.4	10.6	10.3	0.0	-0.1
WHBW699	10.5	10.4	10.6	10.3	0.1	-0.1
WHBW702	10.4	10.9	10.3	10.8	-0.1	-0.1
WHBW702	10.4	10.9	10.3	10.8	0.0	-0.1
WHBW703	11.7	10.5	11.8	10.4	0.0	-0.1
WHBW703	11.8	10.5	11.8	10.4	0.0	-0.1
WHBW705	11.9	9.6	12.0	9.8	0.0	0.2
WHBW705	12.0	9.6	12.0	9.6	0.0	0.0
WHBW706	9.9	10.9	9.6	10.8	-0.3	-0.1
WHBW706	9.8	10.8	9.6	10.8	-0.2	0.0
WHBW706	9.6	10.8	9.6	10.8	0.0	0.0
WHBW708	9.7	9.7	9.7	9.7	0.0	0.1
WHBW708	9.7	9.7	9.7	9.7	0.0	0.0
WHBW711	9.9	9.5	10.0	9.6	0.1	0.1
WHBW711	9.9	9.5	10.0	9.6	0.1	0.1
WHBW713	9.1	9.9	9.2	10.1	0.1	0.2
WHBW713	9.0	9.9	9.2	10.1	0.2	0.2
WHBW714	11.2	10.1	11.2	10.1	0.0	0.0
WHBW714	11.1	10.1	11.2	10.1	0.1	0.0

Table 1 Protein and Moisture Results from the CropScan 4000VT and Foss Nova



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RESULTS – CONT.

Table 3 and 4. shows summarized results for precision and accuracy of the CropScan 4000VT.

Table 5. shows the data as a trend plot.

Table 6 shows the data as a trend plot.

PROTEIN MOISTURE

Average	0.01	0.01
Prediction Error (SDD)	0.09	0.05

Table 2 CropScan precision

PROTEIN MOISTURE

Average	0.01	0.01
Prediction Error (SDD)	0.19	0.11

Table 3 CropScan accuracy

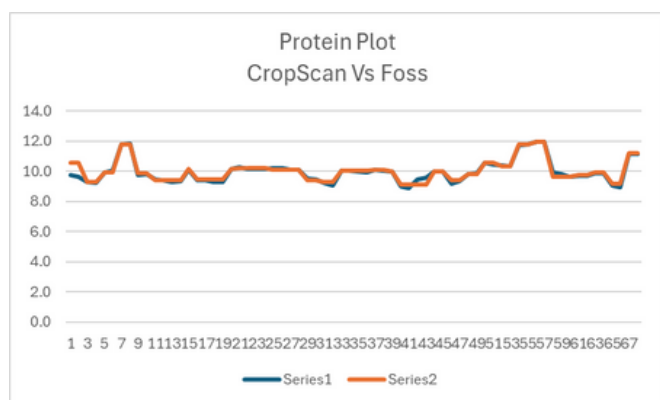


Figure 3 CropScan precision

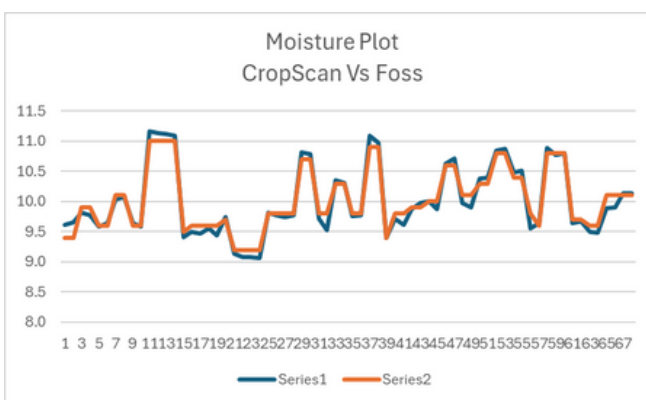


Figure 4 CropScan precision

CONCLUSION

Wheat23H has shown outstanding performance during both the harvest and the 2024 Wheat Calibration Validation study. The impressive results reveal that the Wheat23H calibration predicts Wheat Protein with 0.2% accuracy and Wheat Moisture with 0.1% accuracy under laboratory conditions. Given its high accuracy and precision in predicting Wheat Protein and Moisture, it is recommended to use Wheat23H for the CropScan 2024 harvest.